

HIRDLS

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HIGH RESOLUTION DYNAMICS LIMB SOUNDER

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Subject/Title: H2LSP_Main

Description/Summary/Contents

This subroutine takes information about a profile from the HIRDLS retrieval driver and uses the information to produce a set of profiles along the line of sight. Information is used from an input weighting database file and HIRDLS data from a HIRPROF file or climatology or model or gridded data from a COLOC file.

H2LSP – “Line of sight weighting” – Called by RTP step – Creates profiles along the line of sight and includes the requested observation profile in the middle. This could be either climatology, model, GMAO or a previously retrieved HIRPROF profile.

Keywords:

Purpose of this Document:

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EOS

H2LSP_Main

This subroutine takes information about a profile from the HIRDLS retrieval driver and uses the information to produce a set of profiles along the line of sight. Information is used from an input weighting database file and HIRDLS data from a HIRPROF file or climatology or model or gridded data from a COLOC file. Can also get the data from the previously retrieved profile if requested and available. The requested data flag has three values: H=HIRPROF, C=Climatology M = Model data. The last two are handled the same where the difference is the input data file name from the retrieval driver. The actual data source used flag is set to one of the following depending on data availability: H=HIRPROF, F=Flat field using HIRPROF middle point, I=Middle point interpolated from surrounding HIRPROF data, C=Climatology, G= GMAO, g= GMAO with HIRDLS state vector.

Set up the LOS grid from the information in the HIR2LSGW file – H2LSP_FormLOSGrid

Allocate output data and data source arrays – H2LSP_Allocate

Loop over all products and contaminants

Set the requested source variables and initialize the actual to the same (ParReq and ParAct) – H2LSP_SetParReqAct

If requested data source is 'H', 'C' or 'M', turn off LOS gridding (always do a flat field)

If requested data source is 'G' or 'g'(gridded) then

Check the gridded data for holes and substitute with climatology if needed – H2LSP_CheckGInputData

If requested is 'g', check the middle profile for validity. If middle profile is completely missing or zero, set the profile error flag and skip this profile – H2LSP_CheckMidHProf

If LOS is turned off and requested is 'g'

Assign the middle profile to all of the other Line of sight profiles (form a flat field of HIRDLS data) – H2LSP_FormFlatField

Else

If gridded data does not cover the full vertical range, tie on climatology data – H2LSP_ClimTieOn

If LOS is turned on and requested is 'g'

Normalize the gridded data to the middle profile which is HIRDLS – H2LSP_NormalizeGData

Else if LOS is turned off and requested or actual is 'G', assign middle profile to all other line of sight profiles (form flat field) – H2LSP_FormGFlatField

Set the flags for actual sources used for the LOS grid – H2LSP_SetParAct

Else (requested data is not gridded)

Check the input line of sight weighting database to make sure it has enough weighting information to form the line of sight grid for the input profile – H2LSP_CheckDatabase

Check the input data for missing middle profiles and that there is enough data for gridding – H2LSP_CheckInputData

Load the input data from the appropriate source – H2LSP_LoadInputData

If LOS is turned on and actual is neither 'F' or 'G',

Calculate the weighted data profile using the loaded input data and the HIR2LSGW weights – H2LSP_CalcWeightedData

If actual is 'I', normalize the data to the middle profile, using differences for Temperature and ratios for all other species– H2LSP_NormalizeData

Else

Copy the middle profile to all other line of sight profiles (form a flat field) – H2LSP_FormFlatField

End loop over profiles

Load data the line of sight data into the H2RRT_Los2D structure – H2LSP_LoadOutputData

Load previous HIRDLS profile data if requested and available – H2LSP_LoadPrevProf

Check for missing middle profile data and set an error for the profile– H2LSP_CheckMissData

H2LSP_CheckGInputData

This routine checks for an all missing profile at any line of sight point and substitutes with climatology at all points (a flat field). If all profiles are valid along the line of sight, then locate the minimum and maximum altitudes of non-missing values.

If any of the line of sight profiles is completely missing

 Assign climatology to the output data array for this parameter

Else

 Find the index of the minimum and maximum altitudes with valid data

 Assign the GMAO data to the output data array

 Check for missing data in the middle of a GMAO profile and flag this as a profile error

H2LSP_ClimTieOn

This routine ties on climatology to the top and bottom of the atmospheric data as needed. Calculates a difference for temperature and a ratio for the rest of the parameters.

Loop over all line of sight profiles

 If field is temperature

 Calculate the difference between the last valid GMAO data and the climatology at that same point.

 Apply this same difference to the rest of the climatology profile and assign these values to the final output array

 Else

 Calculate the ratio between the last valid GMAO data and the climatology at that same point.

 Apply this same ratio to the rest of the climatology profile and assign these values to the final output array

H2LSP_NormalizeGData

This subroutine takes the input gridded field and normalizes it to the input (middle) profile.

If the field is temperature

 Determine the profile of differences between the HIRPROF profile and the middle gridded profile

Else

 Determine the profile of ratios between the HIRPROF profile and the middle gridded profile

Loop over all line of sight profiles

 Apply the difference (or ratio) profile to each line of sight profile

 Where values are less than tiny, set them to tiny

H2LSP_CheckInputData

This subroutine takes data input to the line of sight processor and checks for sufficient data for the requested data source and, if not found, uses a flat field or climatology instead and updates the actual data source flag appropriately.

If the actual source is not 'F' and the requested source is not 'C'

 If line of sight is turned on

 If all data is less than zero or missing, set the actual source to 'I' (interpolate from surrounding data)

 Loop over all line of sight profiles

 Count how many weighting profiles are completely filled with valid data (not missing or zero)

 If number of good profiles is less than the minimum number of weighted profiles required

 If actual source is 'I'

 Set the actual source to 'C' (use climatology)

 Else

 Set the actual source to 'F' (use flat field)

 Else (line of sight is turned off)

 If all of requested profile is missing or zero, set the actual source to 'C'

Else if the actual source is 'F' and the requested source is not 'C'

 Set the actual source to 'C'

Else if the actual source is not 'F' and the requested is 'C'

 Set the actual source to 'C'

H2LSP_LoadInputData

This subroutine loads the input data for the line of sight processor based on requested source of data and data availability determined earlier in CheckInputData. There is a tricky thing going on in this routine. LSGW database access is by HIRRAD scan index and data access is by data source profile ID.

If line of sight gridding is turned on

 Retrieve the middle profile from the appropriate data source

Else

 Loop over line of sight angles

 Loop over weighted profiles

 Select the profiles at the specified locations and from the appropriate data source